

The Influence of Learning using Contextual Teaching and Learning Approach to Physics Learning outcomes of High School Students

Caroline Claudia Anggina Neftyan¹, Eko Suyanto^{2*}, Agus Suyatna³

¹Student in Physics Education, Lampung University, Indonesia

^{2*}Lecturer in Physics Education, Lampung University, Indonesia

³Lecturer in Physics Education, Graduate Program, Lampung University, Indonesia

*Corresponding author: ekosuyanto011@gmail.com

Abstract— Learning process should be able to attract interest and make students active in learning, which material can be taken directly through the phenomenon experienced in daily life. This study aims to determine the influence of learning using Contextual Teaching and Learning (CTL) approach to physics learning outcomes of Newton's Law about Motion. The sample is students of class X MIA₅ in SMA Negeri 14 Bandarlampung using Pretest-Posttest Control Group Design. Techniques of data collection using cognitive learning outcomes test instrument. The data analyzed by using normality test, N-Gain test, and Paired Sample T-test. The result of research indicates that there is the influence of using CTL approach in improving student learning outcomes of Newton's Law About motion, with p-value significantly different at 95% confidence level so it can be stated that there is the difference of pretest and posttest mean result using CTL approach. The average N-Gain score is 0.73 which included in the high category. It shows that the application of CTL approach has influence in improving student learning outcomes.

Keywords— Contextual Teaching and Learning Approach, Learning Outcomes.

I. INTRODUCTION

Education in Indonesia is currently moving towards a modern learning era. Conventional learning systems have begun to abandon and now people use innovative, progressive and contextual learning systems. Based on the observation in one of Senior High School in Bandar Lampung, Indonesia, changes of the learning system is not fully perfect. In the application still have learning problems that less difficult to solve, such as less meaningful learning, where most students can not make the relation between the physics concept with its application in daily life. It can be seen through the student learning result that mostly not reach yet the minimum criteria of mastery learning in schools that is equal to 73.

Teacher-centered learning confines students to actively involved in the learning process so as to make the learning process unattractive and cause students lose interest in physics learning. The learning process should be able to attract students and make students actively involved in the learning process, which can be done by applying the learning with Contextual Teaching and Learning (CTL) approach.

CTL approach is an approach involving active students in the learning process to find the concepts learned by linking the material with the knowledge possessed and the student experience in daily life[2]. CTL approach leads students to construct their own new knowledge and skills when students learn, and also CTL approach fully engages students in the learning process[3, 4]. Therefore, the students will be more motivated to be actively involved in the learning process in the classroom.

Components in the implementation of learning with CTL approach consist of 1) constructivism, 2) inquiry, 3) questioning, 4) learning community, 5) modeling, 6) reflection, 7) authentic assessment[5]. Implementation of CTL approach is expected to make students find meaning in the learning that has been done in class with its application in everyday life. To develop student thinking, the material learned by students can be taken directly through the phenomenon experienced in daily life.

CTL approach encourages the child to discover the meaning of learning by linking the material learned with real-life situations so that the knowledge gained will be firmly embedded in his memory. CTL approach aims to increase the motivation of learners to take what they have learned and apply it, making it meaningful in the context of actions and interactions within their daily situations, and also students learn through experience instead of memorizing[6, 7]. The contextual learning is a system that stimulates the brain to construct patterns that embody meaning when students are able to find meaning when students will learn and remember what they have

learned[8]. It is important to apply so that the information received is not only stored in short-term memory, which is easily forgotten, but can be stored in long-term memory so that it will be appreciated and applied in the job task[9]. So that, it is hoped that when students are able to find meaning in their lessons, students will learn and remember what they learn, so it is possible for students to reach learning objectives and gain satisfactory learning outcomes.

Learning outcomes are the learning outcomes that have been achieved from a learning process that has been done by learners, so to know a job is successful or not, it requires a measurement[10]. So through the learning outcomes, it can be seen how far the students can take in and understand the certain subject matter. Through the CTL approach, learning processes that occur in the class will actively involve students and encourage students to discover and build their own concepts so that learning outcomes can be improved[11].

CTL approach has a very close relationship with everyday life, so it is suitable for use in teaching physics material that is easy to find especially by students every day. One such material is Newton's Law of Motion, where its application is often experienced directly without students being aware of it. Based on the explanation, the researcher conducted a study to see whether there is an influence of learning by using CTL approach to student learning outcomes on Newton's Law on Motion material at SMA Negeri 14 Bandarlampung.

II. METHOD

This study uses one experimental class given treatment in the form of learning with CTL approach. The design of this study using One-Group Pretest-Posttest Design. The pretest is used to assess students early and posttest abilities used to assess student learning outcomes after treatment is applied. The study design can be seen in the table below.

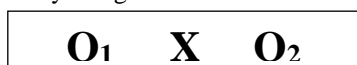


Fig. 1: One Group Pretest-Posttest Design

The population in this study are all student of class X MIA (Mathematics and Science class) in one of senior high school in Bandar Lampung, Indonesia, at the second semester of the academic year 2017/2018. The experimental class is class X MIA₅ as the research sample determined by using classify random sampling technique that is taking 1 class from 6 class population at random. Variable in this study that consists of variable Contextual Teaching and Learning approach and variable of student learning outcomes by applying Contextual Teaching and Learning approach.

The instrument used in this study is the test of cognitive learning outcomes with 15 multiple choices questions on

the subject matter of Newton's Law of Motion. Instruments that have been tested for validity and reliability are then given to students at the time of pretest and posttest implemented. It is done to measure student learning outcomes after being given learning treatment with CTL approach. Based on the data obtained, the researchers conducted a data analysis to compare the average of students initial ability (pretest) with the final ability (posttest) in the sample class. Statistical analysis used is normality test and N-Gain test. To test the hypothesis, the researcher used Paired Sample T-test with IBM SPSS 23 for Windows program.

III. RESULTS AND DISCUSSION

This study was conducted at one of Senior High School in Bandar Lampung, Indonesia, in class X MIA₅ which consist of 32 people with time allocation that is 3 times face to face for 3 hours lesson. The researcher first gives the pretest to the students at the beginning of the activity. Then the researchers continue the learning process by acting as a teacher in the classroom. The questioning component is applied when the teacher gives apperception questions to students. Questions are given related to the phenomenon that students often experience directly in everyday life. Then the teacher displays a video related to the learning material and asks the student to reenact a similar act to the video they have watched. This is the application of the modeling component.

Furthermore, as a form of applying the components of learning and inquiry communities, teachers divide students into small groups to design, perform and create experimental reports related to Newton's Law of Motion. The teacher guides the students to relate the results of the experiments obtained and formulate the results of the analysis that has been done as a form of application of the constructivism component. The teacher invites students to communicate with each other about the results of experiments that have been done and then concluded together with the learning that has been done. Teachers also encourage students to give the impression and suggestions related to the learning that has been done as the application of the reflection component in the CTL approach. Then the teacher gives the exercise and questions to measure the learning outcomes obtained by the students as the application of the authentic assessment component.

Analysis of the instrument in the study using the validity and reliability test with the number of 40 questions to determine the level of validity and reliability of the questions used in data collection of student learning outcomes. Based on the result of the validity test, it is known that there are three invalid questions with the acquisition of $r_{hitung} < r_{tabel}$, or the level of validity

possessed by the three questions does not reach 0.360. So, there are only 37 questions are declared valid and can really measure the student learning outcomes. Then based on the reliability test results, the value of Cronbach's Alpha obtained by 0.950 where the results stated that the questions have a high level of reliability or a high degree of reliability. The value of Cronbach's Alpha is in the range of $0.800 \leq r < 1,000$ with the classification of very high-reliability value. Based on the results of the analysis of the instrument, researchers determine the 15 questions that will be used in the data collection pretest and posttest students.

Data obtained from this study is quantitative which obtained based on pretest and posttest result of the students. Based on Table 1, it can be seen that the average of pretest obtained by the students before being given the learning treatment with CTL approach, only 37 points. This indicates that the initial ability of the students before being given treatment can be said to be low. After being given treatment, it is known that the ability of students in the form of posttest average value has increased by 46 points to 83 points. Based on these results, it can be seen directly that there is a significant increase in student learning outcomes after the researchers provide treatment in learning by using CTL approach. After obtained pretest and posttest value, it can be calculated the value of N-Gain students to know the average increase in student learning outcomes obtained. Through the calculation obtained the average value of N-Gain is 0.73 and included in the high category.

Table 1: Data Result of Pretest, Posttest, and Gain of The Student

Parameter	Pretest	Posttest	Gain
1 The lowest value	13	67	0,38
2 The highest value	67	100	1,00
3 Standard deviation	13,402	8,957	0,134
4 Average value	37	83	0,73

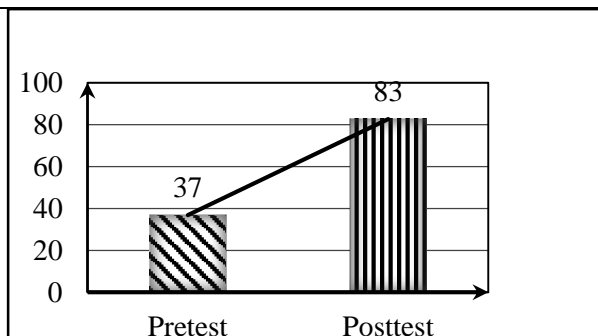


Fig. 2: Graph of Average Comparison of Student Pretest and Posttest Result

After the scores were obtained, the researchers conducted a normality test of the pretest and posttest of the students to determine whether the study sample was normal or not. Based on Table 2, it can be seen that the results of the normality test on pretest and posttest students have a value of $p > 0.05$. So, it can be concluded that the sample used was normally distributed. Thus, the researcher can continue the next step test that was the Paired Sample T-test.

Table 2. The Result of Normality Test of Pretest and Posttest Value

Value of	Kolmogorov-Smirnov	Conclusion
	<i>p</i>	
Pretest	0,089	H_0 accepted
Posttest	0,053	H_0 accepted

Paired Sample T-test or difference test was done to know whether or not the difference in mean learning outcomes of the sample class, provided that the data is normally distributed. Based on Table 3, it can be seen that the p-value obtained is $0,000 < 0.050$ is significantly different at the 95% confidence level so that the decision of the null hypothesis is rejected. This indicates that there is the difference of mean result of pretest and posttest of the students before and after learning with CTL approach.

Table 3. The Result of Paired Sample T-Test

Mean	Std. Deviation	<i>t</i>	df	<i>p</i>	Conclusion
-45,844	11,060	-23,447	31	0,000	H_0 rejected

The average difference between pretest and posttest results obtained by students shows that there is an influence of CTL approach to student learning outcomes. Then, by combining the results of the analysis of posttest results reduced by pretest results and based on N-Gain value, it can be stated that learning using CTL approach can significantly improve student learning outcomes in Newton's Law about Motion material significantly.

The results of this study are supported by the results of another study [1] which states that there is a significant effect due to the application of contextual learning on student learning outcomes. In addition, [12] it was found that with the use of the CTL approach there was a significant effect on student learning outcomes on Dynamic Fluid materials. Then, supported by other study results [13] that learning by CTL approach can improve student learning outcomes.

In the learning process, the students also showed interest by participating actively in finding their own concepts related to Newton's Law about Motion material that was studied. Students also willing to listen to the teacher's

directions in order to obtain the meaning of the learning. During the learning process, students work well together in their respective groups to find the meaning of learning and encouraged to learn independently using the help of instructional media provided by the teacher as modeling component of contextual learning. The results of the study [14] suggest that applying the CTL approach to collaboration between students and teachers in harmonious relationships can stimulate students to think creatively in expressing opinions, improving communication skills, responsibility, confidence, and also building student learning interest.

Students help each other to solve the problems given and appreciate the opinions conveyed to each other. Students do not hesitate to ask the teacher to fulfill their curiosity and ask when experiencing difficulties in understanding the relationship between the material learned in relation to the real life. Thus, the learning activities run well and create an active learning community atmosphere. This is supported by the results of the study [15] which states that students will seek solutions to integrate all the learned material concepts with high understanding, skills, and teamwork so that student learning achievement increases significantly.

Students have been motivated to learn Newton's Law about Motion material and stimulate students thinking skills to discover the meaning of their learning so that students are easier to remember the material they have learned. This is supported by the results of the study [16] which states that learning with the CTL approach is effective in improving students critical thinking skills. Active role in learning makes students able to find the meaning contained in the learning and remember the material that has been learned so that students are able to obtain better learning outcomes and achieve learning objectives. This is supported by the results of the study [17] which states that if students activeness increases, student learning outcomes increase, meaning the quality of learning also increases.

Based on the study done, it can be seen that by getting the meaning of learning, then the students were able to get better learning outcomes. This shows that the application of learning by using CTL approach has a good influence in improving student learning outcomes on Newton's Law about Motion material. Thus, CTL approach can be used as an alternative learning that can be applied by teachers in an effort to improve student learning outcomes.

IV. CONCLUSION

Based on the results of the study and the discussion that has been presented, it can be concluded that there is the influence of learning using Contextual Teaching and Learning approach to student learning outcomes, evidenced by the difference of average pretest and posttest

result of students significant at 95% confidence level. Contextual Teaching and Learning approach has a very good effect in improving student learning outcomes, as evidenced by the increase of student learning outcomes and high N-Gain value.

REFERENCES

- [1] Aritonang, E. S., dan Hakim, A. (2014). Pengaruh Model Pembelajaran Kontekstual Terhadap Hasil Belajar Siswa pada Materi Perpindahan Kalor dan Asas Black di Kelas X Semester II SMA St. Thomas 3 Medan T.A 2013/2014. *Jurnal Inpafi* (ISSN: 2334-4624), 2(3), 11-19.
- [2] Selvianiresa, D., and Prabawanto, S. (2017). Contextual Teaching and Learning Approach of Mathematics in Primary Schools. *International Conference on Mathematics and Science Education (ICMScE)*, IOP Conf. Series: Journal of Physics: Conf. Series 895 012171. doi:10.1088/1742-6596/895/1/012171.
- [3] Rusmini, Surya, E. (2017). The Effect of Contextual Learning Approach to Mathematical Connection Ability and Student Self-Confidence Grade VIII SMMP Negeri 8 Medan. *International Journal of Sciences: Basic and Applied Research (IJSBAR)* (ISSN: 2307-4531), 35(2), 249-262.
- [4] Wahyuni, T., Suwandi, S., Slamet, S. Y., and Andayani. (2015). The Implementation of Contextual Approach in Solving Problems Understanding Syntax: Sentence Indonesian at Universities in Surakarta, Indonesia. *Journal of Education and Practice* (ISSN: 2222-1735 (P) | ISSN: 2222-288 (O)), 6(30), 188-201.
- [5] Al-Tabany, T. I. B (2014). Mendesain Model Pembelajaran Inovatif, Progresif, dan Kontekstual: Konsep, Landasan, Implementasinya pada Kurikulum 2013 (Kurikulum Tematik Integratif/KTI). Jakarta: Kencana.
- [6] Ilhan, Nail et al. (2016). The Effect of Context-based Chemical Equilibrium on Grade 11 Students' Learning, Motivation and Constructivist Learning Environment. *International Journal of Environment & Science Education* (ISSN: 1306-3065), 11(9), 3117-3137.
- [7] Fadillah, A., Dewi, N. P. L. C., Ridho, D., Majid, A. N., dan Prastiwi, M. N. B. (2017). The effect of application of contextual teaching and learning (CTL) model-based on lesson study with mind mapping media to assess student learning outcomes on chemistry on colloid systems. *International Journal of Science and Applied Science: Conference Series* (ISSN: 2549-4635 (P) | ISSN: 2549-4627 (O)), 1(2), 101-108.

-
- [8] Johnson, E. B. 2014. Contextual Teaching & Learning Menjadikan Kegiatan Belajar-Mengajar Mengasyikkan dan Bermakna. Bandung: Kaifa.
- [9] Surdin. (2018). The Effect of Contextual Teaching and Learning (CTL) Models on Learning Outcomes of Social Sciences of The Material of Forms The Face of The Earth on Class VII of Junior High School. International Journal of Education and Research (ISSN: 2411-5681), 6(3), 57-64.
- [10] Tobing, M. T., Saragi, D., dan Bungana, R. (2017). Influence Of Contextual Teaching Learning (CTL) Learning Model and Critical Thinking ON THE Learning Results of Civic Education for 7th Grade Students of Imelda School Medan School Year 2017/2018. IOSR Journal of Research & Method in Education (IOSR-JRME) (ISSN: 2320-737X (P) | ISSN: 2320-7388 (O)), 7(5), 25-31.
- [11] Setyorini, W. dan Dwijananti, P. 2014. Pengembangan LKS Fisika Terintegrasi Karakter Berbasis Pendekatan CTL untuk Meningkatkan Hasil Belajar. Unnes Physics Education Journal (ISSN: 2252-6935 (P) | ISSN: 2503-2313 (O)), 3(3), 63-71.
- [12] Situmorang, R., dan Sitinjak, L. 2015. Pengaruh Pendekatan Pembelajaran Kontekstual Terhadap Hasil Belajar Siswa pada Materi Pokok Fluida Dinamis Semester Genap Kelas XI SMA Negeri 9 Medan T.P 2012/2013. Jurnal Inpafi (ISSN: 2334-4624), 3(2), 150-157.
- [13] Nurhidayah., Yani, A., dan Nurlina., 2015. Penerapan Model Contextual Teaching Learning (CTL) Terhadap Hasil Belajar Fisika Pada Siswa Kelas XI SMA Handayani Sungguminasa Kabupaten Gowa. Jurnal Pendidikan Fisika (ISSN: 2302-8939 (P) | ISSN: 2527-4015 (O)), 4(2), 161-172.
- [14] Ekowati, C., Darwis, M., Upa, H., dan Tahmir, S. (2015). The Application of Contextual Approach in Learning Mathematics to Improve Students Motivation At SMPN 1 Kupang. International Education Studies (ISSN: 1913-9020 (P) | ISSN: 1913-9039 (O)), 8(8), 81-86.
- [15] Suryawati, E., dan Osman, K. 2018. Contextual Learning: Innovative Approach towards the Development of Students' Scientific Attitude and Natural Science Performance. EURASIA Journal of Mathematics, Science and Technology Education (ISSN: 1305-8215 (P) | ISSN: 1305-8223 (O)), 14(1), 61-76.
- [16] Nasrun. 2014. Contextual Learning Approach in Improving Critical Thinking Skills of Guidance and Counseling Students of State University of Medan. International Journal of Sciences: Basic and Applied Research (IJSBAR) (ISSN: 2307-4531), 18(1), 151-161.
- [17] Murtiani., Fauzan, A., dan Wulan, R. 2012. Penerapan Pendekatan Contextual Teaching and Learning (CTL) Berbasis Lesson Study dalam Meningkatkan Kualitas Pembelajaran Fisika di SMP Negeri Kota Padang. Jurnal Penelitian Pembelajaran Fisika (ISSN: 2252-3014), 1(1), 1-8.